

## CLAIMS

1. An image similarity calculation system comprising an image similarity calculation unit configured to:

5 use a probability model of a probability for an editing process to be applied to an image;

compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of an reference image; and

10 calculate an image similarity between the inquiry image and the reference image.

2. The image similarity calculation system according to claim 1, wherein

15 the probability model is determined for each region; and the image similarity calculation unit is configured to use the probability model when comparing the feature quantity for each divided small region of the inquiry image and the feature quantity for each divided small region of the reference image.

20 3. The image similarity calculation system according to claim 1, wherein the image similarity calculation unit is configured to use the probability model when calculating the image similarity between the inquiry image and the reference image.

25 4. The image similarity calculation system according to claim 1, wherein

the probability model is determined for each region; and the image similarity calculation unit is configured to use the probability model when comparing the feature quantity for each divided small region of the inquiry image and the feature quantity for each divided small region of the reference image and when calculating the image similarity between the inquiry image and

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the reference image.

5. An image similarity calculation system comprising an image similarity calculation unit configured to:

- 5       compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image, using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image for each local region, and
- 10       calculate an image similarity between an inquiry image and a reference image.

6. An image similarity calculation system comprising an image similarity calculation unit configured to:

- 15       compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image so as to calculate an overall image's similarity;

      modify the overall image's similarity by using a threshold value for determining a match between images, the threshold value being calculated based on a probability for a editing process to be applied to an image for each local region or based on a probability distribution of the number of local regions where an editing process is applied to an image; and

- 20       value for determining a match between images, the threshold value being calculated based on a probability for a editing process to be applied to an image for each local region or based on a probability distribution of the number of local regions where an editing process is applied to an image; and
- 25       calculate an image similarity between the inquiry image and the reference image.

7. An image similarity calculation system comprising an image similarity calculation unit configured to:

- 30       compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image, using an image-region-based weight value calculated based on a probability for a editing process to

be applied an image for each local region so as to calculate an overall image's similarity;

modify the overall image's similarity using a threshold value for determining a match between images, the threshold value being calculated based on a probability for an editing process to be applied an image for each local region; and

calculate an image similarity between the inquiry image and the reference image.

10           8. The image similarity calculation system according to claim 5, further comprising:

          editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region using a learning image or a device  
15   characteristic, as the probability for the editing process to be applied to the image for each local region.

          9. The image similarity calculation system according to claim 5, further comprising:

20           editing probability calculation means configured to calculate a probability that an editing process was applied to an image for each local region using an edited inquiry image, as the probability for the editing process to be applied to the image for each local region.

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          10. The image similarity calculation system according to claim 6, further comprising:

          editing probability distribution calculation means configured to calculate a probability for an editing process to be applied to an image for each local region or a probability  
30   distribution of the number of local regions where an editing process is applied to an image, using a learning image or a device characteristic, as the probability for the editing process to be

applied to the image for each local region or the probability distribution of the number of local regions where an editing process is applied to an image.

5           11. The image similarity calculation system according to claim 6, further comprising:

          editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region or probability distribution of the  
10 number of local regions where an editing process is applied to an image using an edited inquiry image, as the probability for the editing process to be applied to the image for each local region or the probability distribution of the number of local regions where an editing process is applied to an image.

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          12. The image similarity calculation system according to claim 7, further comprising:

          editing probability calculation means configured to calculate a probability for an editing process to be applied to  
-----20 an image for each local region using a learning image or a device characteristic, as the probability for the editing process to be applied to the image for each local region.

          13. The image similarity calculation system according to  
25 claim 7, further comprising:

          editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region using an edited inquiry image, as the probability for the editing process to be applied to the image  
30 for each local region.

          14. An image similarity calculation system comprising:  
          editing probability model estimation means configured to

calculate, as a local region editing probability, a probability for an editing process to be applied to an image for each local region using a learning image or a device characteristic supplied as input;

5           local region weight calculation means configured to calculate a weight value for each local region in an image as a local region weight value based on the local region editing probability;

10           image division means configured to divide an edited inquiry image supplied as input into small regions;

            small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

15           small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

20           calculate a similarity of feature quantities for respective small regions as a small region similarity; and

            image similarity calculation means configured to calculate an image similarity between the inquiry image and the reference image by weighting the small region similarity using a  
25           small-region-based weight value found from the local region weight value.

15. An image similarity calculation system comprising:

30           editing region detection means configured to calculate, as a local region editing probability, a probability that an editing process was applied to an image for each local region using an edited inquiry image supplied as input;

            a local region weight calculation means configured to

calculate a weight value for each local region in an image as a local region weight value based on the local region editing probability;

5 image division means configured to divide the inquiry image into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

10 small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

15 calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation means configured to calculate an image similarity between the inquiry image and the reference image by weighting the small region similarity using a  
20 small-region-based weight value found from the local region weight value.

16. An image similarity calculation system comprising:

editing probability model estimation means configured to  
25 calculate a local region editing probability or editing-targeted local region count probability distribution using a learning image or a device characteristic supplied as input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the  
30 editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process is applied to an image;

match determination threshold calculation means configured



to calculate a threshold value for determining a match between images as a match determination threshold based on the local region editing probability or editing-targeted local region count probability distribution;

5 image division means configured to divide an edited inquiry image supplied as input into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature  
10 quantity;

small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry  
15 image small region feature quantity, and

calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation means configured to calculate an overall image's similarity from the  
20 small region similarity,

modify the overall image's similarity using the match determination threshold, and

calculate an image similarity between the inquiry image and the reference image.

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17. An image similarity calculation system comprising:

editing region detection means configured to calculate a local region editing probability or editing-targeted local region count probability distribution using an edited inquiry image  
30 supplied as input, the local region editing probability being a probability that an editing process was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the

number of local regions where an editing process was applied to an image;

match determination threshold calculation means configured to calculate a threshold value for determining a match between  
5 images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

image division means configured to divide the inquiry image into small regions;

10 small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

small region similarity calculation means configured to  
15 compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

calculate a similarity of feature quantities for  
20 respective small regions as a small region similarity; and

image similarity calculation configured to

calculate an overall image's similarity from the small region similarity,

25 modify the similarity using the match determination threshold, and

calculate an image similarity between the inquiry image and the reference image.

18. The image similarity calculation system according to  
30 any one of claims 10, 11, 16, and 17, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating occurrence probability distribution of an overall



image's similarity found from a similarity for each small region in images between an edited image and an original image based on the local region editing probability or the editing-targeted local region count probability distribution.

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19. The image similarity calculation system according to claim 12 or 13, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating an overall  
10 image's similarity based on a local region weight value, by using the local region weight value.

20. The image similarity calculation system according to any one of claims 8, 9, 12, 13, 14, 15, and 19, wherein the local  
15 region weight calculation means is configured to:

decrease the local region weight value when the local region editing probability is high; and

increase the local region weight value when local region editing probability is low.

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21. The image similarity calculation system according to claim 20, wherein the local region weight calculation means is configured to calculate the local region weight value as a difference between 1 and the local region editing probability.

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22. The image similarity calculation system according to any one of claims 8 to 13, wherein the editing probability calculation means is configured to calculate the local region editing probability by using a method of automatically detecting  
30 the edited region to specify the edited region.

23. The image similarity calculation system according to claim 14 or 16, wherein the editing probability model estimation

means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

5           24. The image similarity calculation system according to claim 15 or 17, wherein the editing region detection means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

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25. The image similarity calculation system according to any one of claims 1 to 21, wherein the local region is a divided region so as to correspond to a small region in the inquiry image or the reference image.

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26. The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image is an equally sized rectangular region resulting from dividing an image.

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27. The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image is one of regions which are divided so as to be partially overlap with each other.

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28. The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image results from dividing only part of an image.

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29. The image similarity calculation system according to any one of claims 1 to 28, wherein the feature quantity is based on at least one of color information, edge information, texture

information, shape information, and motion information.

30. The image similarity calculation system according to any one of claims 1 to 28, wherein the feature quantity is at least one of an average value, a mode value, and a median value for color coordinates specified in color space systems such as RGB color space, HSV color space, YUV color space, YIQ color space, YCbCr color space, L\*a\*b\* color space, and XYZ color space, and Dominant Color, Color Layout, Scalable Color, Color Structure, Edge Histogram, Homogeneous Texture, Texture Browsing, Contour Shape, and Shape 3D specified in international standard ISO/IEC15938-3.

31. The image similarity calculation system according to any one of claims 1 to 30, wherein the editing process corresponds to at least one of superposing a ticker on an image, superposing a caption on an image, superposing a character on an image, superposing an object on an image, partially cutting an image, partially cropping an image, partially mosaicking an image, and partially blurring an image.

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32. An image retrieval system to retrieve images using an image similarity calculated in the image similarity calculation system according to any one of claims 1 to 13.

25 33. An image retrieval system comprising:

editing probability model estimation means configured to calculate a probability for an editing process to be applied to an image for each local region using learning image or a device characteristic supplied as input, as a local region editing probability;

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local region weight calculation means configured to calculate a weight value for each local region in an image as a local region weight value based on the local region editing

probability;

image division means configured to divide an edited inquiry image supplied as input into small regions;

5 small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

10 reference image group small region feature quantity storage means configured to store small region feature quantities for respective reference images in a reference image group composed of a plurality of previously registered reference images;

15 small region similarity calculation means configured to compare a small region feature quantity of each reference image stored in the reference image group small region feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

20 image similarity calculation means configured to weight a small region similarity calculated by the small region similarity calculation means for each of the reference images using a small-region-based weight value found from the local region weight value, and

25 calculate an image similarity between the inquiry image and each reference image in the reference image group; and retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on the image similarity calculated by the image similarity calculation means for each reference image.

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34. An image retrieval system comprising:

editing region detection means configured to calculate a probability that an editing process was applied to an image for

each local region as a local region editing probability, using an edited inquiry image supplied as input;

local region weight calculation means configured to calculate a weight value for each local region in an image as a  
5 local region weight value, based on the local region editing probability;

image division means configured to divide the inquiry image into small regions;

small region feature quantity extraction means configured  
10 to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for  
15 respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to compare a small region feature quantity of each  
reference image stored in the reference image group small region  
20 feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

image similarity calculation means configured to  
25 weight a small region similarity calculated by the small region similarity calculation means for each of the reference images using a small-region-based weight value found from the local region weight value, and

calculate an image similarity between the inquiry  
30 image and each reference image in the reference image group; and

retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on the image similarity calculated by the image

similarity calculation means for each reference image.

35. An image retrieval system comprising:

editing probability model estimation means configured to  
5 calculate a local region editing probability or editing-targeted  
local region count probability distribution using a learning  
image or a device characteristic supplied as input, the local  
region editing probability being a probability for an editing  
process to be applied an image for each local region, the  
10 editing-targeted local region count probability distribution  
being a probability distribution of the number of local regions  
where an editing process is applied to an image;

match determination threshold calculation means configured  
to calculate a threshold value for determining a match between  
15 images as a match determination threshold, based on the local  
region editing probability or editing-targeted local region count  
probability distribution;

image division means configured to divide an edited inquiry  
image supplied as input into small regions;

20 small region feature quantity extraction means configured  
to extract a feature quantity for each small region from the  
divided small regions as an inquiry image small region feature  
quantity;

reference image group small region feature quantity storage  
25 means configured to store small region feature quantities for  
respective reference images in a reference image group composed  
of a plurality of previously registered reference images;

small region similarity calculation means configured to  
compare a small region feature quantity of each  
30 reference image in a reference image group stored in the reference  
image group small region feature quantity storage means with the  
inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature



quantities for each reference image as a small region similarity;

image similarity calculation means configured to

calculate an overall image's similarity from the  
small region similarity for each of the reference images

5 calculated by the small region similarity calculation means,

modify the similarity using the match determination  
threshold, and

calculate an image similarity between the inquiry  
image and each reference image in the reference image group; and

10 retrieval result output means configured to output a  
retrieval result for the inquiry image from the reference image  
group based on the image similarity calculated by the image  
similarity calculation means for each reference image.

15 36. An image retrieval system comprising:

editing region detection means configured to calculate a  
local region editing probability or editing-targeted local region  
count probability distribution using edited inquiry image  
supplied as input, the local region editing probability being a  
20 probability that an editing process was applied to an image for  
each local region, the editing-targeted local region count  
probability distribution being a probability distribution of the  
number of local regions where an editing process was applied to  
an image;

25 match determination threshold calculation means configured  
to calculate a threshold value for determining a match between  
images as a match determination threshold, based on the local  
region editing probability or editing-targeted local region count  
probability distribution;

30 image division means configured to divide the inquiry image  
into small regions;

small region feature quantity extraction means configured  
to extract a feature quantity for each small region from the

divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for  
5 respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to  
compare a small region feature quantity of each  
reference image in a reference image group stored in the reference  
10 image group small region feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

image similarity calculation means configured to  
15 calculate an overall image's similarity from the small region similarity for each of the reference images calculated by the small region similarity calculation means,  
modify the similarity using the match determination threshold, and

20 calculate an image similarity between the inquiry image and each reference image in the reference image group; and

retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on an image similarity calculated by the image  
25 similarity calculation means for each reference image.

37. The image retrieval system according to claim 35 or 36, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match  
30 determination threshold by estimating occurrence probability distribution of an overall image's similarity found from a similarity for each small region in images between an edited image and an original image based on the local region editing

probability or the editing-targeted local region count probability distribution.

38. The image retrieval system according to claim 35 or 36, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating an overall image's similarity based on the local region weight value, by using the local region weight value.

39. The image retrieval system according to any one of claims 33, 34, and 38, wherein the local region weight calculation means is configured to decrease the local region weight value when the local region editing probability is high, and to increase the local region weight value when local region editing probability is low.

40. The image retrieval system according to claim 39, wherein the local region weight calculation means is configured to calculate the local region weight value as a difference between 1 and the local region editing probability.

41. The image retrieval system according to claim 33 or 35, wherein the editing probability model estimation means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

42. The image retrieval system according to claim 34 or 36, wherein the editing region detection means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

43. The image retrieval system according to any one of claims 33 to 40, wherein the local region is a divided region so as to correspond to a small region in the inquiry image or the reference image.

44. The image retrieval system according to any one of claims 33 through 40 and 43, wherein a small region in the inquiry image or the reference image is an equally sized rectangular region resulting from dividing an image.

45. The image retrieval system according to any one of claims 33 to 40 and 43, wherein a small region in the inquiry image or the reference image is one of regions which are divided so as to be partially overlap with each other.

46. The image retrieval system according to any one of claims 33 to 40 and 43, wherein a small region in the inquiry image or the reference image results from dividing only part of an image.

47. The image retrieval system according to any one of claims 33 to 46, wherein the feature quantity is based on at least one of color information, edge information, texture information, shape information, and motion information.

48. The image retrieval system according to any one of claims 33 to 47, wherein the feature quantity is at least one of an average value, a mode value, and a median value for color coordinates specified in color space systems such as RGB color space, HSV color space, YUV color space, YIQ color space, YCbCr color space, L\*a\*b\* color space, and XYZ color space, and Dominant Color, Color Layout, Scalable Color, Color Structure, Edge Histogram, Homogeneous Texture, Texture Browsing, Contour Shape,

and Shape 3D specified in international standard ISO/IEC15940-3.

49. The image retrieval system according to any one of claims 33 to 47, wherein the editing process corresponds to at least one of superposing a ticker on an image, superposing a caption on an image, superposing a character on an image, superposing an object on an image, partially cutting an image, partially cropping an image, partially mosaicking an image, and partially blurring an image.

50. An image retrieval system to output an image similar to an inquiry image from a plurality of reference images based on a calculated image similarity using an image similarity calculation system according to any one of claims 1 to 29.

51. An image similarity calculation method comprising the steps of:

using a probability model of a probability for an editing process to be applied to an image;

comparing a feature quantity for each divided small region of the inquiry image with a feature quantity for each divided small region of the reference image; and

calculating an image similarity between an inquiry image and an reference image.

52. An image similarity calculation method comprising the steps of:

comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image; and

calculating an image similarity between an inquiry image

and an reference image.

53. An image similarity calculation method comprising the steps of:

- 5       calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image;
- 10       modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on a probability for an editing process to be applied to an image for each local region or based on probability distribution of the number of local regions where an editing process is applied to an image; and
- 15       calculating an image similarity between the inquiry image and the reference image.

54. An image similarity calculation method comprising the steps of:

- 20       calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be
- 25       applied to an image for each local region;
- modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on the probability of editing an image for each of the local regions; and
- 30       calculating an image similarity between the inquiry image and the reference image.

55. An image similarity calculation method comprising the



steps of:

calculating a probability for an editing process to be applied to an image for each local region as a local region editing probability, using a learning image or a device characteristic supplied as input;

calculating a weight value for each local region in the image as a local region weight value based on the local region editing probability;

dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity; and

calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

56. An image similarity calculation method comprising the steps of:

calculating a probability that an editing process was applied to an image for each local region as a local region editing probability, using an edited inquiry image supplied as input;

calculating a weight value for each local region in an image as a local region weight value, based on the local region editing probability;

dividing the inquiry image into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

5        comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity; and

10        calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

15        57. An image similarity calculation method comprising the steps of:

calculating a local region editing probability or editing-targeted local region count probability distribution using a learning image or a device characteristic supplied as  
20        input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process is applied to an image;

25        calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

30        dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

5       calculating a similarity of feature quantities for respective small regions as a small region similarity;

          calculating an overall image's similarity from the small region similarity;

10       modifying the overall image's similarity using the match determination threshold; and

          calculating an image similarity between the inquiry image and the reference image.

15       58. An image similarity calculation method comprising the steps of:

          calculating a local region editing probability or editing-targeted local region count probability distribution using an edited inquiry image supplied as input, the local region editing probability being a probability that an editing process  
20       was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process was applied to an image;

25       calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

          dividing the inquiry image into small regions;

30       extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

          comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for

a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity;

5 calculating an overall image's similarity from the small region similarity;

modifying the overall image's similarity using the match determination threshold; and

10 calculating an image similarity between the inquiry image and the reference image.

59. An image similarity calculation program for allowing a computer to perform a process of:

15 taking into account a probability model of a probability for an editing process to be applied to an image;

comparing a feature quantity for each divided small region of the inquiry image with a feature quantity for each divided small region of the reference image; and

20 calculating an image similarity between an inquiry image and an reference image.

60. An image similarity calculation program for allowing a computer to perform a process of:

25 comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image; and

30 calculating an image similarity between an inquiry image and an reference image.

61. An image similarity calculation program for allowing a computer to perform a process of:

calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image;

5        modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on a probability for an editing process to be applied to an image for each local region or based on probability distribution of the number of local regions where an editing  
10 process is applied to an image; and

calculating an image similarity between the inquiry image and the reference image.

62. An image similarity calculation program for allowing  
15 a computer to perform the processes of:

calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value  
20 calculated based on a probability for an editing process to be applied to an image for each local region;

modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on the probability of editing an image for each  
25 of the local regions; and

calculating an image similarity between the inquiry image and the reference image.

63. An image similarity calculation program for allowing  
30 a computer to perform the processes of:

calculating a probability for an editing process to be applied to an image for each local region as a local region editing probability, using a learning image or a device characteristic

supplied as input;

calculating a weight value for each local region in the image as a local region weight value based on the local region editing probability;

5       dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

10       comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

15       calculating a similarity of feature quantities for respective small regions as a small region similarity; and

calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

20

64. An image similarity calculation program for allowing a computer to perform the processes of:

25       calculating a probability that an editing process was applied to an image for each local region as a local region editing probability, using an edited inquiry image supplied as input;

calculating a weight value for each local region in an image as a local region weight value, based on the local region editing probability;

dividing the inquiry image into small regions;

30       extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity



that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for  
5 respective small regions as a small region similarity; and

calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

10

65. An image similarity calculation program for allowing a computer to perform the processes of:

calculating a local region editing probability or editing-targeted local region count probability distribution  
15 using a learning image or a device characteristic supplied as input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of  
20 local regions where an editing process is applied to an image;

calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

25 dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

30 comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for  
respective small regions as a small region similarity;

calculating an overall image's similarity from the small  
region similarity;

5        modifying the overall image's similarity using the match  
determination threshold; and

calculating an image similarity between the inquiry image  
and the reference image.

10        66. An image similarity calculation program for allowing  
a computer to perform the processes of:

calculating a local region editing probability or  
editing-targeted local region count probability distribution  
using an edited inquiry image supplied as input, the local region  
15 editing probability being a probability that an editing process  
was applied to an image for each local region, the  
editing-targeted local region count probability distribution  
being a probability distribution of the number of local regions  
where an editing process was applied to an image;

20        calculating a threshold value for determining a match  
between images as a match determination threshold, based on the  
local region editing probability or editing-targeted local region  
count probability distribution;

dividing the inquiry image into small regions;

25        extracting a feature quantity for each small region from  
the divided small regions as an inquiry image small region feature  
quantity;

comparing a reference image small region feature quantity  
that is a previously prepared small region feature quantity for  
30 a reference image supplied as input with the inquiry image small  
region feature quantity;

calculating a similarity of feature quantities for  
respective small regions as a small region similarity;

calculating an overall image's similarity from the small region similarity;

modifying the overall image's similarity using the match determination threshold; and

5        calculating an image similarity between the inquiry image and the reference image.